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FOREST PLANTING LEAFLET.

WHITE WILLOW (Salix alba).

FORM AND SIZE.

The white willow is a medium-sized tree characterized by a short, thick trunk and a large, rather irregular crown composed of many small branches. The size of the tree at maturity varies with locality. In the region where it occurs naturally a height of 70 or 80 feet and a diameter of 3 or 4 feet are attained. When planted in the Middle West, a height of from 50 to 60 feet and a diameter of from 1½ to 2 feet are all that may be expected. When close planted on moist soil the tree forms a tall, slender stem well cleared of branches.

The root system is very extensive. When planted in dry situations the roots penetrate the soil for many feet in all directions in search of moisture.

The common name "white willow" is also applied to another exotic species, the *Salix fragilis*, which is similar to the *Salix alba* in form and habits. It is properly called "crack willow," owing to the fact that its characteristic straight, dark-green branchlets are brittle at the base and snap off readily.

RANGE.

The white willow was introduced into the United States very early in the settlement of the country. It is a native of the eastern hemisphere, where its range is from southern Scandinavia to the Mediterranean, and through Siberia, western Asia, and northern Africa.

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It is now naturalized from the St. Lawrence Valley to the Potomac River and westward. The tree occurs singly and in groups along the banks of streams and on moist bottom lands. It is never the predominating species.

It has been planted and successfully grown over a large area, extending through the Northern States, south to Virginia, Kentucky, and Tennessee, and west to Missouri, Kansas, Colorado, and the Dakotas.

HABITS AND GROWTH.

The white willow prefers a moist, rich, sandy loam of alluvial origin. Throughout its natural range the tree attains its best development and is most frequently found on low, moist ground along the banks of streams. It would undoubtedly spread to the uplands were it not for the fact that the seeds invariably fail to germinate when lodged on high and dry situations. It is sufficiently hardy to grow on the dry prairies of the Dakotas, but its growth on upland situations is considerably slower than when planted in the bottom lands. Although a light-demanding tree, it forms a dense canopy when close planted.

The rate of growth is largely dependent upon site conditions. On low, moist soil an annual height growth of 3 feet with a diameter increase of 1 inch is not unusual, while on upland situations a yearly increase of from 1½ to 2 feet in height and from one-half to three-fourths inch in diameter is all that may be expected.

With the exception of the oaks, the willow is said to be infested with more insects than any other tree in North America. Most of these are leaf-eating insects, but there are also borers, gall producers, and scales. Should insects appear in alarming numbers, specimens, accompanied by a full description of their work, should be sent to the Bureau of Entomology, Department of Agriculture, for identification and information in regard to methods of control. The principal insects which affect willow are considered in an article, by Dr. F. H. Chittenden, in Bulletin No. 46 of the Bureau of Forestry, pages 63–80.

Willows are subject to a number of fungous diseases. Those of economic importance are "rust" and the "red rot." A mildew sometimes covers the leaves late in the season with a white web. In the spring and early fall small branches are often covered with a fungus, the spores of which will blacken the hand of a person breaking off one of the infected branches. When fungi are believed to be present, specimens should be sent to the Bureau of Plant Industry, Department of Agriculture, where examinations are made and methods of treatment suggested.

ECONOMIC USES.

The wood of the white willow is very soft, light, flexible, and fairly strong. It is used in slack cooperage and for cricket and baseball bats. Charcoal made from the wood is used in the manufacture of gunpowder. Willow is fairly durable in contact with the soil and, because of scarcity of better material, it has been generally used for fence posts on the northwestern plains. Well-seasoned posts will last from four to seven years.

The white willow, so called, has been planted extensively in Iowa, Nebraska, Minnesota, North Dakota, and South Dakota. The species generally planted in Minnesota and the Dakotas has been the *Salix fragilis*, which has proven itself to be well adapted to this region. This tree is quite as useful as the true white willow, and may be used as a substitute for it.

The rapid growth, hardiness, and profuse branching habit of the white willow make it valuable for windbreak planting. In regions where timber is scarce its chief use is for fuel. Although it does not grow as rapidly as cottonwood, its fuel value is somewhat greater. On moist bottom land a plantation will produce from 2 to 3 cords of wood per acre annually.

The white willow is well adapted for reclaiming and holding the soil along streams. The facility with which it reproduces itself and the ease with which it can be propagated make its use very effective and inexpensive. The planting of this tree along irrigation ditches, however, is not advisable because the roots mingle freely with the water, and thus retard the flow and interfere with the maintenance of the ditches.

METHODS OF PROPAGATION.

In its natural range the white willow is reproduced largely from seed. The common and least expensive method of propagation is by cuttings. These may be of any convenient size; even branches or poles large enough for posts may be used. However, cuttings 8 to 10 inches long from twigs about three-fourths of an inch in diameter are most suitable for general purposes. Clean 2-year-old branches or strong, well-ripened 1-year-old twigs from healthy, vigorous trees should be selected for the cuttings. It is better to make cuttings in the fall, after growth ceases, and to keep them buried in a cool cellar or in well-drained soil until the following spring. Cuttings can also be successfully rooted if made before growth starts in the spring.

The tree sprouts freely from the stump. This characteristic furnishes the best means of perpetuating a plantation for posts or fuel. The young shoots grow from the stump with such vigor that the sec-

ond crop is more likely to consist of straight post timber than the first. Many crops may be cut in this manner, with subsequent renewals of the stand by sprouts.

PLANTING.

The cuttings should be planted on well-prepared soil as soon as the frost is out of the ground. In planting, the cutting should be placed in a slanting position, and the upper two buds should be left uncovered. If the soil is wet, it need not be packed by trampling, but on less moist sites the cuttings should be firmly set in the soil.

In windbreak planting the best results will be realized if the cuttings are placed at 2-foot intervals in rows 8 feet apart. In pure plantations the spacing may be 2 by 8 feet or 3 by 8 feet. When planted in mixture a spacing of 4 by 6 feet is more suitable.

While it does well in mixture with cottonwood, the white willow thrives best in pure plantations or when planted in single rows. When close packed it produces a slender, straight trunk that may be utilized for posts, poles, or fence rails.

CULTIVATION AND CARE.

The plantation should be tilled frequently until the ground is well shaded. This cultivation will destroy weeds and prevent excessive evaporation of moisture from the soil. When the trees are 8 to 10 years old those which are becoming overtopped may be removed.

In case of serious attack by insects, specimens should be sent to the Bureau of Entomology of the Department of Agriculture for identification and advice as to treatment.

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